

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

FISH PASSAGE

(Each)

CODE 396

DEFINITION

Modification or removal of barriers that restrict or prevent movement or migration of fish.

PURPOSE

Allow upstream and downstream movement of fish past barriers where feasible or desirable.

CONDITIONS WHERE PRACTICE APPLIES

All rivers, streams, and outlets of ponds or lakes where barriers impede desired fish passage.

CRITERIA

General Criteria Applicable To All Purposes

Actions taken to provide fish passage shall seek to avoid adverse affects to endangered, threatened, and candidate species and their habitats, as well as state species of concern, whenever possible. Refer to GM 190 ECS-Part 410.22 for actions affecting listed species.

Fish passage measures shall be designed so fish will not suffer excessive energy deficits or undue physical stress when swimming past a fish passage structure or site.

Fish passage shall be designed so that fish shall not be excessively delayed during passage at the structure or site unless modification or removal of a barrier, such as a tidegate, could result in undesirable effects to other resources.

Minimum and maximum flows through fish passage structures or sites must be adequate to attract target fish to the structure or site.

Location and overall design of fish passage structures, or fish passage features, shall accommodate watershed conditions such as variations in stream flow and bedload movement.

Location and overall design of fish passage structures or features shall accommodate different aquatic species and age classes to the extent possible.

Location and overall design of fish passage structures or features shall be compatible with local conditions and stream geomorphology.

[After dam removal, the stream channel upstream and downstream of the dam site will have the appropriate physical dimensions to transport flows and sediment load.](#)

Materials selected for constructing fish passage structures will be non-toxic to fish and other aquatic life.

At stream crossings, jump height below culverts and flow velocity through culverts should not exceed the abilities of those target species expected to move upstream and downstream of the site.

Modifications to [or removal of](#) dams to provide fish passage must be in accordance with existing laws and engineering specifications for dams.

[Planned dam removal projects will:](#)

- [Be based on an assessment of watershed conditions that affect the physical, biological, and chemical conditions of the stream and its riparian area \(see references\).](#)

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

- Be based on an assessment of current stream and riparian conditions. The assessment shall evaluate channel morphology, geomorphic setting, aquatic species, riparian and or floodplain conditions, and any habitat limitations for aquatic species (see references).
- Where appropriate, emphasize the establishment of an ecologically self-sustaining stream-riparian system consistent with the watershed conditions and geomorphic setting.
- List the aquatic species and life history for which the stream is being managed.

All planned work shall comply with all Federal, state and local laws and regulations.

CONSIDERATIONS

Native game and non-game fish species and amphibians as well as endangered, threatened, and candidate, rare and other sensitive species shall be carefully considered when designing and implementing fish passage features

Consider a stream simulation design for culverts at road crossings that incorporates natural streambed substrates.

Consider removal of the barrier or fish passage before installing a fish ladder.

If replacement of an in-channel structure will cause degradation or aggradation of the channel upstream, installation of bed controls appropriate for the geomorphic conditions of the site and fish passage needs should be considered (see Stream Channel Stabilization –Code 584 and Grade Stabilization Structure – Code 410).

Consider potential negative effects of providing passage for invasive or non-native species that may hybridize with, compete with, or spread disease to native fish or other aquatic species above a barrier.

Consider other aquatic and terrestrial species, including endangered and threatened species that have established habitat in areas where barriers currently exist or in upstream and downstream areas that would be directly affected by the action.

Consider the amount of habitat both upstream and downstream of a barrier and the potential for connectivity of important habitats for fish species of concern.

Consider seasonal variations in headwater and tailwater levels and how these may impact passage hydraulics for the life history stages of the fish for which the structure is being designed.

Consider the need to prevent entrainment of fish, particularly juveniles, in irrigation diversions by installing screens.

Consider the need to design for strategic resting places for target species facing long passages.

Consider historical structures when planning. This practice may affect cultural resources and should comply with GM 420, Part 401, during planning, prior to installation and during maintenance of fish passage structures.

Consider the need to balance fish passage with other water management objectives.

To the extent possible, fish passage structures should be designed to minimize excessive predation on fish entering or exiting the structure.

Removal of a fish passage barrier should take into consideration effects on wetlands, flooding potential, existing infrastructure and social impacts.

Consider sediment that could be mobilized during installation of a fish passage system or during and after dam removal including its effects on aquatic biota, water quality, and existing infrastructure.

Consider restoring aquatic habitat in conjunction with dam removal in the upstream and downstream reaches adjacent to the dam (see Stream Habitat Improvement and Management – 395).

When an in-channel structure is impassable due to downstream channel incision and there is evidence of historical channels near the incised channel, consider bypassing the barrier by restoring historical channels.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Plans and specifications shall be in keeping with this practice and shall describe the details adequately to apply the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed for all applications. The plan shall provide for periodic inspection and prompt repair should fish passage become impaired or inoperable at the structure or site.

REFERENCES

Fish Passage Design at Road Culverts. Includes manual, barrier assessment, research, and references. Washington Department of Fish and Wildlife, March 1999. <http://www.wa.gov/wdfw/hab/engineer/habeng.htm>

FishXing Software and Learning Systems for fish passage through culverts. Includes software, field inventory forms and instructions, and extensive bibliography. USFS & Partners. <http://www.stream.fs.fed.us/fishxing/>

Fish-stream Crossing Guidebook. British Columbia Ministry of Forests. March 2002. <http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>

Maine DOT Fish Passage Policy and Design <http://www.state.me.us/mdot/finalfishpassage5.pdf>

Oregon Road/Stream Crossing Restoration Guide. Spring, 1999. <http://www.nwr.noaa.gov/1salmon/salmesa/4docs/orfishps.htm>

Phase I, II, III Stream Assessment Protocols, VT ANR DEC, Stream Team, 2002

Salmonid Stream Habitat Restoration Manual. California Department of Fish and Game – Native Anadromous Fish & Watershed Branch. 1998. <http://www.dfg.ca.gov/nafwb/index.shtml>
VTDEC Hydrologic Regional Curves. VTDEC, 2002